

**NOMINATION OF
THE EAST-WEST TELEGRAPH
FOR AN
NATIONAL ENGINEERING LANDMARK**



SOUTH AUSTRALIA AND WESTERN AUSTRALIA DIVISIONS

2 June 2001

NOMINATION OF THE EAST-WEST TELEGRAPH FOR A NATIONAL ENGINEERING LANDMARK

CONTENTS

Section	Page
1. Statement of Significance	1
2. Commemorative Plaque Nomination	2
3. Engineering Heritage Significance	3
4. Significant Locations	5
5. Key Dates in the Construction	6
6. Telegraphy in the Colonies	7
7. Decision to Build the Line	10
8. Choosing the Route	11
9. Construction — South Australia	13
10. Construction — Western Australia	15
11. Completion of the Line	18
12. Operating the Telegraph	19
Bibliography	21



Prepared by the South Australia and Western Australia Divisions
The Institution of Engineers, Australia

2 June 2001

NATIONAL ENGINEERING LANDMARK: THE EAST-WEST TELEGRAPH, ADELAIDE TO PERTH, 1877

1. STATEMENT OF SIGNIFICANCE

"Australia's prosperity and its rate of growth in the 19th century partly depended on the degree of skill with which its people pursued financial profit in every form of business, and that skill in turn depended on an accurate knowledge of the price of the commodity on which each individual hoped to make his profit. For Australia the international telegraph perhaps served the same useful function that a long-range weather-forecast would have served for farmers"

Geoffrey Blainey, *The Tyranny of Distance*, 1982

The telegraph and the steam engine were the two inventions which had the most profound effects on nineteenth century communications. Of the two it was the telegraph, now overshadowed by the later more powerful technologies of telephone and radio, which had the greater impact on Australian society, business and government, constrained as they were by the "tyranny of distance" in a manner experienced by few other contemporary societies.

It was the telegraph which reduced communication times between the Australian colonies from weeks to minutes and between London and the colonies from months to hours. It was this revolution in communications which paved the way for British investment in the Australian mineral boom of the 1880s and 1890s (which surpassed the mining boom of the 1850s) and for the increased commercial and political ties between the Australian colonies which led to Federation.

The East-West Telegraph joined almost one-third of the continent to a vital communications network with the other Australian Colonies and, through the Overland Telegraph, to the rest of the world. For Charles Todd, it was an essential part of his vision "... in the present age of wonders ..." to unite the commercial, administrative, and strategic interests of Colonies separated by the (to a European) unimaginable distances of the wide brown land.

By 1900, the statistician T A Coghlan could write: "In no other country in the world has the development of telegraphic communication been so rapid as in Australasia."

**NATIONAL ENGINEERING LANDMARK:
THE EAST-WEST TELEGRAPH, ADELAIDE TO PERTH, 1877**

2. COMMEMORATIVE PLAQUE NOMINATION

Name of Work: The East-West Telegraph, Adelaide to Perth

Years of Construction: 1875 – 1877 (Port Augusta to Albany)

1 January 1875	First pole ceremonially planted at Albany by WA Governor Weld
25 August 1875	First pole ceremonially planted at Port Augusta by Mayor Gibson
15 July 1877	South Australian section of line to Eucla completed
8 December 1877	Western Australian section of line to Eucla completed
	First telegraph message received in Perth

Description

Total length of line: 3310 km (Adelaide to Perth)

SA Section	Adelaide to Port Augusta	354 km (220 miles)
	Port Augusta to Eucla	1221 km (759 miles)
WA Section	Perth to Albany	547 km (340 miles)
	Albany to Eucla	1207 km (750 miles)

Number of poles:

SA Section	12 474 galvanised wrought iron poles
WA Section	approx 17 000 squared jarrah poles

Repeater stations at:

SA Section	Port Lincoln, Streaky Bay, Smoky Bay, Fowlers Bay Franklin Harbour (Cowell) added in 1885; Yardea added in 1896
Border	Eucla
WA Section	Eyre, Israelite Bay, Esperance, Bremer Bay Balladonia added in 1897

Location

The route of the line and significant locations are shown in the map on page 5.

This nomination proposes markers at Whyalla in South Australia and at Esperance and Albany in Western Australia.

**NATIONAL ENGINEERING LANDMARK:
THE EAST-WEST TELEGRAPH, ADELAIDE TO PERTH, 1877**

3. ENGINEERING HERITAGE SIGNIFICANCE

Technological/Scientific Value

The East-West Telegraph is similar to the Overland Telegraph in that it used commercially available technology and introduced no innovations or new discoveries. Instead, its significance lies in the construction of a major communications infrastructure over considerable distances in harsh, difficult, and isolated conditions.

Historical Value

Very significant. The East-West Line followed the completion of the Overland Telegraph which linked the eastern colonies (South Australia, Victoria, New South Wales, Queensland, and Tasmania) to the rest of the world and joined Western Australia to a nation-wide communication network.

Social Significance

Very significant. At first, Western Australia was the principal beneficiary of the communication link with the colonies to the east. But with the discovery and development of the Western Australian goldfields, significant commercial use was made of the line. A communication link to Western Australia was also an essential element in laying the foundation for the Federation of Australian Colonies.

Demonstration of Custom, Process, or Function

Very significant. A relatively simple construction provided significant social and commercial benefits.

People Associated with the Work

Edward John Eyre established that a route from Port Lincoln across the Great Australian Bight to Albany was possible (1839-1841)

James Coates Fleming, WA's first Superintendent of Telegraphs, was responsible for the construction of the Albany to Eucla section of the East-West Telegraph

John Forrest (later Sir John Forrest and Premier of Western Australia) confirmed that a route retracing Eyre's journey from King George Sound to Fowlers Bay via Eucla was suitable for the proposed telegraph line (1870)

Richard Randall Knuckey, SA's first Line Inspector, was overseer of the construction in South Australia and supervisor of the section from Fowlers Bay to Eucla

Charles Todd (later Sir Charles), SA Superintendent of Posts and Telegraphs, architect of the Overland Telegraph, planned the South Australian section of the East-West Telegraph

Landscape or Environmental Value Not applicable.

Contribution to Setting Not applicable.

Original Integrity

None. Apart from a few remnants (see below), the line no longer exists.

An undersea cable from Cottesloe (WA) to Adelaide was laid in 1902 and then increasing use was made of wireless telegraphy. The remaining interstate telegraph traffic was switched to the new trunk line which followed the transcontinental railway and opened in 1927. The coastal line continued to serve local communities but was soon replaced by the telephone and telex.

Important Stage in Development

A major development in the nation's communications linking Western Australia to South Australia and thence to the eastern colonies and, via the Overland Telegraph Line, to the world.

Demonstrates Technological Change

Used established technology and was strongly influenced by the practical experience gained in building and maintaining the Overland Telegraph.

Unique or Intact

The construction of the East-West Telegraph was a project similar to and benefiting from the experience of building the Overland Telegraph Line. It used simple construction materials and readily available telegraph equipment.

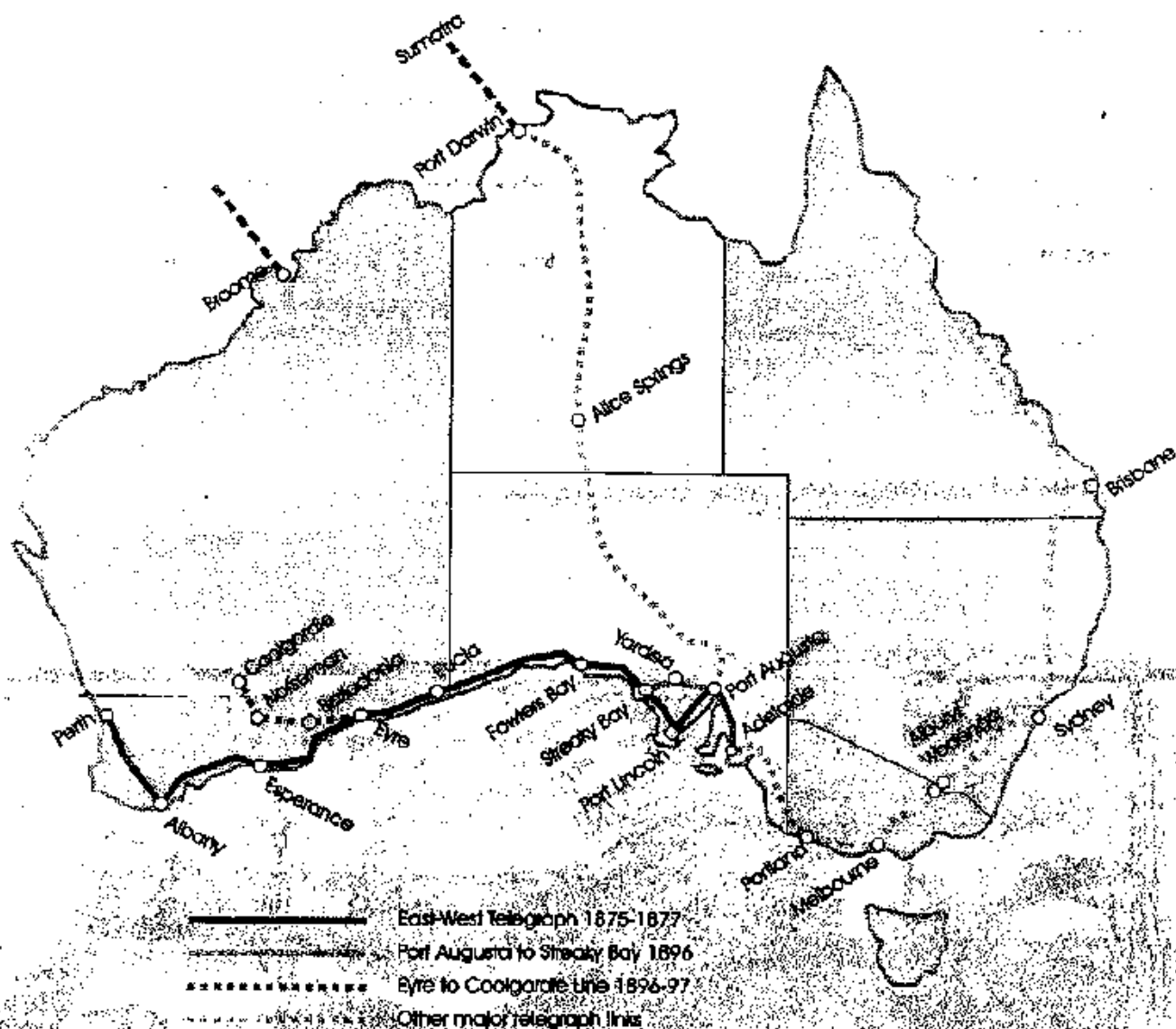
Of the nine original repeater stations, Eucla — where messages had to be formally transferred between the two colonies — is the best known but was abandoned in 1927 and has been substantially covered by sand dunes.

In South Australia, most of the repeater stations, which usually served as post and telegraph offices, still stand with some being adapted for other purposes. Scattered numbers of the original galvanised iron poles can be found on various pastoral properties.

In Western Australia, the original wooden repeater station buildings were replaced by stone buildings in the late 1890s. These have now been adapted to other uses or are substantial ruins. Some of the original poles still exist near Eyre telegraph station together with some of the iron poles used on the additional line built from Eucla to Coolgardie via Eyre in 1896-1897.

NATIONAL ENGINEERING LANDMARK: THE EAST-WEST TELEGRAPH, ADELAIDE TO PERTH, 1877

4. SIGNIFICANT LOCATIONS



Albany

Starting point of the Western Australian section

Coolgardie

Terminal point of the 1896-97 line from Eyre

Eucia

Site of the telegraph station linking the two colonial networks

Eyre

Start of the 1896-97 line to Coolgardie via Balladonia and Norseman

Fowlers Bay

Start of the difficult Nullabor crossing, site of repeater station

Streaky Bay

Junction of the 1896 direct line from Port Augusta; site of repeater station

Port Augusta

Starting point of the South Australian section

Port Lincoln

Finishing point of the first SA section

NATIONAL ENGINEERING LANDMARK: THE EAST-WEST TELEGRAPH, ADELAIDE TO PERTH, 1877

5. KEY DATES IN THE CONSTRUCTION

7 July 1841	Edward John Eyre reaches Albany after crossing Nullabor from Port Lincoln
1860	Adelaide-Perth telegraph link via Eucla first mooted
31 August 1866	Port Augusta telegraph station opened
21 June 1869	Western Australia's first telegraph from Perth to Fremantle completed
25 August 1870	John Forrest arrives in Adelaide after crossing Nullabor from Esperance to Fowlers Bay
15 September 1870	First pole of Overland Telegraph Line sunk at Port Darwin
19 November 1871	Undersea cable from Java (Indonesia) landed in Port Darwin
22 August 1872	Overland Telegraph Line joined near Frews Ironstone Ponds
20 October 1872	Entire Overland Telegraph Line in service
1 January 1873	Western Australia establishes Posts & Telegraphs Department
3 September 1873	Formal proposal from Western Australian Government to South Australian Government to connect the two colonies
9 November 1873	Colonial Secretary for Western Australia, F P Barlee, visits Adelaide to discuss East-West line
1874	Colonial Governments commit to financing construction of East-West line
2 December 1874	Tenders for the four main western Australian contracts close
1 January 1875	First pole planted at Albany by Governor Sir Frederick Weld
20 January 1875	Tenders called for construction of line from Port Augusta to Eucla via Fowlers Bay but no offers received
6 February 1875	Walter Thomson tenders for first two sections from Port Augusta to Port Lincoln and Port Lincoln to Fowlers Bay
April 1875	Work commences on Western Australian section
25 August 1875	First pole planted at Port Augusta by Mayor Thomas McTurk Gibson
17 January 1876	First section to Port Lincoln completed, 317 km (197 miles)
8 May 1876	Bremer Bay station open to traffic
1 September 1876	Work commences on third SA section under Government supervision
8 September 1876	Esperance station open to traffic
26 September 1876	Second SA section to Fowlers Bay completed, 536 km (333 miles)
5 December 1876	Israelite Bay station open to traffic
15 July 1877	Third SA section to Eucla completed, 368 km (229 miles)
17 July 1877	Eyre station open to traffic
8 December 1877	Albany to Eucla line completed, 1207 km (750 miles) — communication established between Adelaide and Perth

**NATIONAL ENGINEERING LANDMARK:
THE EAST-WEST TELEGRAPH, ADELAIDE TO PERTH, 1877**

6. TELEGRAPHY IN THE COLONIES

As the telegraph system was extended from the Mediterranean west through Asia Minor, a connection to Australia was contemplated as early as 1854. The landing point would be the north-west of Western Australia and the various Colonial Governments were expected to build their own connections to it. The potential of telegraphy was generally well recognised. On 3 March that year, Samuel McGowan had completed Australia's first telegraph line — between Melbourne and Williamstown — and South Australia's Governor Richard MacDonnell was looking for someone to take charge of a Magnetic Telegraphs Department.

The energetic Charles Todd was selected for the task and set about connecting Adelaide, Port Adelaide, and Semaphore with a telegraph line so that early warning of the anticipated Russian invasion could be given to the capital. Todd had a clear vision of both national and international telegraph systems. Soon after accepting his new position, he wrote to Charles Sturt:

I look forward to ... the time when the telegraph system will be extended to join the several seats of commerce in Australia and also, it is no idle dream in the present age of wonders, ... connecting Asia by submarine cable thence to Calcutta to London. [Moyal, 1984, p.20]

Todd's first efforts were directed to the east. The Victorian Government expressed interest in the proposal of a telegraph connection and Todd met with McGowan in July 1856. The Victorian network had spread as far as Portland and McGowan only had to extend it to the border. Todd's task was to construct about 480 kilometres of line from Adelaide: this was begun in April 1857 and the two colonies were in telegraphic communication from July the following year. Four months later, Todd's former assistant, Edward Cracknell, now Superintendent of Telegraphs in New South Wales, completed the line to from Sydney to Albury that linked the three colonies.

In 1859, Charles Todd commenced construction of a second inter-colonial line to Melbourne, this time via Wellington in New South Wales. The line opened in 1861. There was no direct link to from Adelaide to Sydney until 1867.

By 1866 there were 57 telegraph stations throughout South Australia stretching from Port Augusta to Mount Gambier (the border station for the Adelaide-Melbourne line).

Queensland (separated as an independent colony from New South Wales in 1859) called tenders for the construction of a line from Brisbane to the New South Wales border in September 1860. The line was operational to Ipswich by April 1861 and reached the border the following November where it was linked to a line from Sydney through Tenterfield.

Tasmania was linked to Victoria by telegraph in 1859 via what was then the longest submarine cable yet laid; however, it operated erratically for less than two years. Undeterred, the Tasmanians laid a second cable in 1869 which was so successful that it was duplicated in 1885.

Western Australia lagged behind the other colonies in adopting the telegraph. In February 1868, Edmund Stirling, a Perth newspaper proprietor frustrated by the slow communication between the capital and its port, Fremantle, proposed to build a telegraph line and asked the Government to supply and erect the poles. At first Colonial Secretary Frederick Bartlee declined the offer but then, the following year, he agreed to erect both the poles and wire in exchange for a reduced rate for official messages.

The first pole was planted in Perth on 9 February 1869. As an indication of the general interest of Western Australians in the telegraph, only six people were present and four of these were employees of Stirling's new enterprise, The Western Australian Telegraph Company.

The first message was transmitted on 21 June: it congratulated "... the inhabitants of Fremantle on this annihilation of distance between the Port and the Capital ..." (the distance was 20 kilometres).

Technical advice for the line and its supervision was provided by James Coates Fleming. Fleming had a progressive vision of how the colony could be served by the telegraph and, in the same year as the Fremantle line was completed, prepared a plan for the extension of the telegraph system to all settled areas in the colony.

Linking West to East

A telegraph line along the coast from South Australia (Port Augusta) to Albany had been first proposed by Charles Todd, the South Australian Superintendent of Telegraphs, in 1860. The line was to meet up with a submarine cable from Ceylon to King George Sound which had been proposed by the Direct English and Australian Company. This was one of six different schemes put forward between 1859 and 1870 by different companies for connecting the Australian colonies to the cable systems from India to London. While proposing the east-west telegraph link, Todd warned that long submarine cables were "risky" and suggested that an overland line to the north coast and a short submarine cable to Java would be preferable.

In January 1870, the Queensland and New South Wales Governments made a provisional agreement with Captain Sherard Osborne of the Telegraph Construction and Maintenance Company for the company to lay a submarine line from Java to Port Darwin and build a land line from there to join the Queensland telegraph system at Burketown (on the Gulf of Carpentaria). This forced the South Australian Government's hand.

As an alternative, they proposed to build a line from Port Augusta to Darwin themselves. In June 1870, the Port Augusta to Port Darwin Telegraph Bill was passed by the Parliament and Todd was instructed to proceed with the construction of the 2900 kilometre telegraph line. What was later called the "greatest engineering feat" in nineteenth century Australia was completed in just over two years in August 1872.

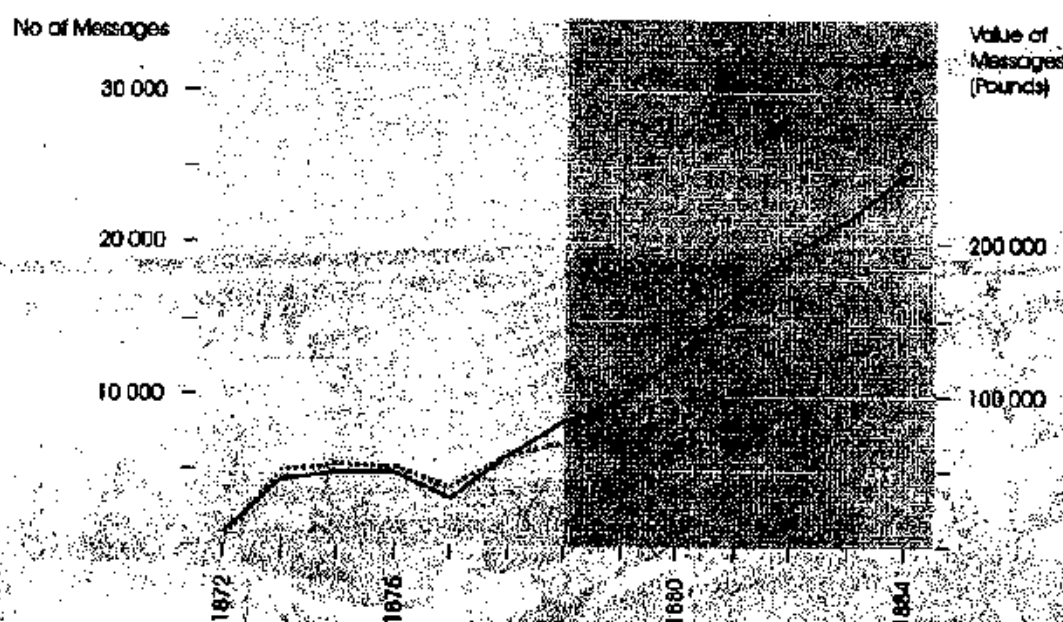
In February 1870, in Perth, Fleming submitted his plan for connecting all the small settlements in Western Australia west and south of Perth to the telegraph. Not being aware of the Queensland and New South Wales Government's agreement with Osborne, Fleming argued persuasively that a submarine cable from Ceylon to King George Sound was technically and strategically the most advantageous method of linking the Australian colonies with India. His telegraph system was therefore based on a main line from Perth to Albany. Its beauty was that, irrespective of whether the submarine cable was built, the Perth to Albany line had good commercial prospects because the rapid conveyance of news brought by the mail steamers making their first Australian port of call at Albany was eagerly awaited in Perth. Fleming's plan was endorsed by Governor Weld.

To implement it, Fleming formed the Electro-Magnetic Telegraph Company (EMT) which took over the earlier Western Australian Telegraph Company. The Perth to Albany line was completed in December 1872.

Under its agreement with the Government, EMT owned and erected the poles and lines and supplied the telegraph equipment while the Post Office operated the service and provided both staff and buildings. The British Colonial Office, however, did not approve of such a joint private and public system and, in 1873, the Western Australian Government bought out EMT. Fleming was then appointed the first Western Australian Government Superintendent of Telegraphs.

Australians were enthusiastic users of the telegraph and traffic grew rapidly. Telegraph business, with Europe climbed from 826 messages in 1872 to 5771 in 1877, despite a high average cost which only started to show economies of scale in subsequent years. The telegraph departments usually operated at a loss but, at the Intercolonial Conference of 1873, the Colonial Governments acknowledged the importance of building and maintaining the telegraphy service, even if it was "... at some pecuniary loss" [Moyal, 1985, p 34].

Telegraph Business with Europe, 1872-1884
(Source: Technology in Australia, 1788-1988, pp 540, 541)



NATIONAL ENGINEERING LANDMARK: THE EAST-WEST TELEGRAPH, ADELAIDE TO PERTH, 1877

7. DECISION TO BUILD THE LINE

The construction of a link between Adelaide and Perth had been discussed as early as 1860 but it was not until 3 September 1873 that the South Australian Government received a firm proposal from the Western Australian Government.

In the late 1860s, Governor Sir Frederick Weld recognised the importance to Western Australia of a telegraph link. South Australia had been linked to the eastern colonies since 1858 and was rumoured to want to build a line north (the Overland Telegraph). Weld wanted to investigate a possible route which would follow Eyre's arduous journey around the Great Australian Bight and chose John Forrest to lead an expedition. Forrest had already earned a reputation as the "Young Explorer" and had the benefit of Eyre's account of his journey. The party of six men, including Forrest's younger brother Alexander, set out from Esperance on 9 May 1870. The expedition was carefully planned and Forrest sent the schooner *Adur* ahead to wait for the party at Israelite Bay (24 May) and then Eucla (2 July) with supplies. Forrest made frequent diversions to the north, where he found grassy country but little sign of water, and reached Adelaide on 25 August, five months after leaving Perth.

A year after the Overland Telegraph had connected South Australia and the eastern colonies to Europe, Fleming submitted a proposal to Governor Weld for the construction of a telegraph line from Albany to Eucla on the South Australian border. In the following month, September 1873, the Western Australian Colonial Secretary wrote to the South Australian Government indicating its willingness to participate in the construction of a line between Perth and Adelaide. Frederick (later Sir Frederick) Barlee, the Colonial Secretary, arrived in Adelaide on 9 November to discuss the proposal and shortly afterwards the Western Australian Executive Council carried a resolution in favour of the telegraph line.

At first the South Australian Government refused the funds, considering the work premature, but the way was left open for the project to be considered again the following year. Although he recognised that South Australia had less to gain, Charles Todd (then Superintendent of Telegraphs) was convinced that the line was necessary for trade and commerce, navigation, and defence. On 30 January 1874, he wrote to Barlee reassuring him that South Australia would agree to undertake the project. "Most people," he wrote, "regard the work as I do — as a national obligation which our geographical position compels us to fulfil." [Gooley, 1974, p3]

During 1874, both colonial governments passed bills approving the expenditure on the construction of telegraph. At that stage, the actual route of the line had yet to be determined.

NATIONAL ENGINEERING LANDMARK: THE EAST-WEST TELEGRAPH, ADELAIDE TO PERTH, 1877

8. CHOOSING THE ROUTE

By 1865 the South Australian telegraph network had been extended to Port Augusta where a telegraph office was opened the following year. Port Augusta was the staging post for the Overland Telegraph and the obvious point of departure for the new line to the east.

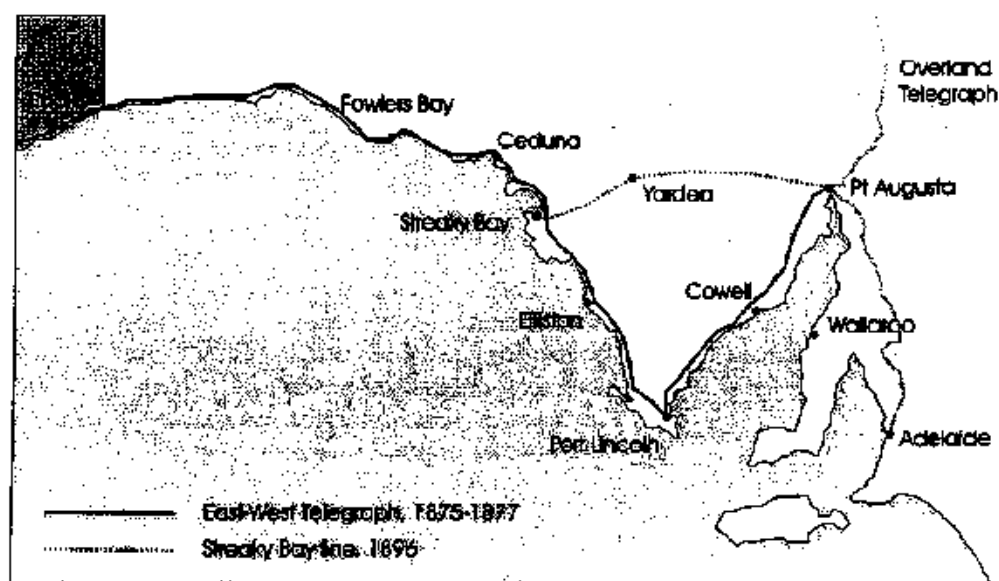
Although he didn't find the hoped-for grazing land, Edward John Eyre had shown, in 1841, that it was possible to cross the continent from east to west. In 1870, Western Australian Governor Weld commissioned John (later Sir John) Forrest to prove that the route was practical for the construction of a telegraph line.

South Australia

In South Australia, there was some concern about the choice of a coastal route to service communities of Port Lincoln, Streaky Bay, and Fowlers Bay instead of the more direct route to Eucla through the Gawler Ranges (essentially following Forrest's route). According to the *Cyclopedia of South Australia*, the "adverse atmospheric conditions of the coast" were well recognised.

A number of petitions had been received to include Port Lincoln in the line. One option was to build the line to Streaky Bay and then connect Port Lincoln with a spur line from either Streaky Bay or Port Augusta, essentially going along two sides of a triangle. However, the mineral deposits along Spencers Gulf and the grazing properties along the western side of Eyre Peninsula tipped the balance in favour of the coastal route. (A fourth option of a submarine cable across the Gulf to Franklin Harbour (Cowell) and thence around the coast was rejected as too expensive.)

In 1896, another line was built from Port Augusta and was routed inland through a repeater station at Yardea. It met the coastal line at Streaky Bay.

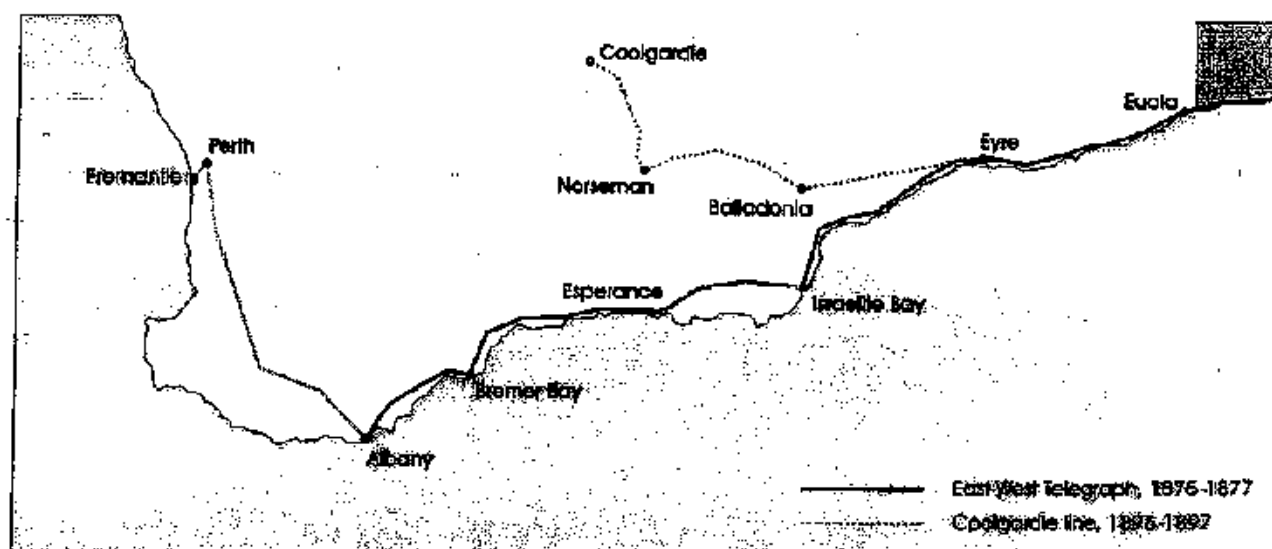


Western Australia

By any standards the construction of nearly 2500 kilometres (1500 miles) of telegraph line from Port Augusta to Albany along a coastline, most of which was virtually unknown and which was subject to notoriously rough seas, was an epic undertaking. One third of the Western Australian section had no European inhabitants and in the remainder there were only very scattered pastoral settlements. For Western Australia, the least advanced of the Australian colonies and with a population of less than 25 000, the project was by far the most ambitious public work the colony had ever attempted. Although it already boasted 1450 kilometres (900 miles) of telegraph line, the Western Australian Posts and Telegraph Department still lacked the experience in telegraph construction of its counterparts in the other colonies and Fleming's management skills were still largely untested.

Fleming had recommended a preliminary survey of the coastline in order to locate at least twelve safe landing places along the coast where the poles and other equipment could be landed. When the advice of John Forrest, then Deputy Surveyor General, was sought, Fleming was dismayed to hear that Forrest thought a preliminary survey unnecessary. Forrest considered that the information gained by him on his 1870 expedition would be adequate to guide contractors, despite its limited information on coastal conditions.

In 1896, an extension was built from Eucla to Coolgardie to handle the enormous volume of traffic generated by the goldfields. It ran parallel to the East-West line and then turned inland at the head of the bay about 10 kilometres west of the repeater station at Eyre. It was completed in 1897. The line consisted of two-piece tubular iron poles strung with iron wire. A copper line was added a few years later.



**NATIONAL ENGINEERING LANDMARK:
THE EAST-WEST TELEGRAPH, ADELAIDE TO PERTH, 1877**

9. CONSTRUCTION — SOUTH AUSTRALIA

Port Augusta to Fowlers Bay

The South Australian Government called tenders in January 1875 but no offers were received. The Port Augusta to Fowlers Bay section was then divided into two sections — Port Augusta to Port Lincoln (317 kilometres or 197 miles) and Port Lincoln to Fowlers Bay (536 kilometres or 333 miles) — and the tender was readvertised in February.

This time, tenders were received for these two sections (but not the Fowlers Bay to Eucla section which was recognised as the most difficult). They varied from £18/16/0 to £75/0/0 per mile. The work included clearing a strip six metres (20 feet) either side of the line. The successful tenderer was Walter Thomson, an experienced line contractor from O'Halloran Hill.

The availability of timber for poles again a problem in South Australia (echoed many years later when the economical distribution of electricity required the invention of a cheaply-manufactured concrete and steel pole in lieu of suitable local wood). Oppenheimer galvanised iron poles, as used on the Overland Telegraph Line, were to be used in South Australia. Materials were made available to Thomson at Port Adelaide and he was responsible for getting them to the site.

The coastal vessel *Ferret* took the first load of material to Port Augusta and work commenced on 25 August 1875 when the first pole was planted in Loudon Road, Port Augusta West, by the Mayor, Thomas McTurk Gibson.

The route was surveyed and pole positions pegged by Government surveyors working under the direction of G J McMinn (who had been one of the Overseers on the Overland Telegraph). Poles were spaced at intervals of five chains (10 poles to the kilometre or 16 poles to the mile).

The third section was advertised yet again in March, this time divided into two parts. Thomson was the sole tenderer but his prices of £13/15/0 and £35/0/0 were considered too high and so Todd decided that his Department would build this section itself.

The man chosen to supervise the project was Richard Randall Knuckey, an experienced surveyor and line inspector. In 1870, Knuckey had been transferred from his job as a surveyor with the Crown Lands Department to the Posts and Telegraphs Department to work on the Overland telegraph. He was appointed South Australia's first Line Inspector on 1 August.

As Overseer of the East-West line, Knuckey was required to have "... active and immediate supervision of the erection of the line, to certify that all the work was carried out and completed according to specifications, and to examine and initial all progress returns before any instalments could be passed for payment."

Water and other supplies were carted from Port Augusta. When the line clearing reached Franklin Harbour (Cowell), this port became the entry point for supplies. (At first the telegraph line bypassed Franklin Harbour, much to the disappointment of local settlers, but a few years later

Todd decided that a connection could be justified on the grounds that "... it would greatly facilitate the inspection of the line ... which, owing to the absence of water and the dense scrub passed through, is often exceedingly difficult and even a rather dangerous matter ...". The line was looped in and out of Cowell in 1885.)

The line to Port Lincoln was completed on 17 January 1876.

The line to Fowlers Bay was completed on 26 September 1876.

The difficult construction had been completed in just 13 months, averaging 16 kilometres (10 miles) per week.

Fowlers Bay to Eucla

The third section to Eucla was again advertised on 1 March 1876, this time in two sections. Only one tender was received (from Walter Thomson) and it was considered too expensive (£46 per mile to Yeer Comban Cowie at the head of the Bight then £56 to Eucla). Instead, the Government decided to erect the line itself and Richard Randall Knuckey was put in charge. His team included his brother John, G R McMinn, Frank Marchant, A T Woods, John Thomson (son of Walter Thomson), and 38 men.

The rugged coastline west of Fowlers Bay afforded few suitable landing places and so the 4000 poles and 40 tons of wire had to be carted overland through sand dunes and dense scrub. Sufficient material was landed at Fowlers Bay to reach about 90 kilometres beyond the head of the Bight (a total of 250 kilometres); material for the remaining 130 kilometres was landed at Eucla.

As expected, the hot, dry conditions proved to be the major obstacle. The major task which consumed the greater part of the transport resources was the carting of fodder and water. At three places between Fowlers Bay and Eucla, iron tanks were placed underneath a butterfly roof to collect rainwater.

Work commenced on 1 September 1876 and was completed on 15 July the following year, the linesmen having worked through the searing summer so that the connection to Western Australia was not delayed.

**NATIONAL ENGINEERING LANDMARK:
THE EAST-WEST TELEGRAPH, ADELAIDE TO PERTH, 1877**

10. CONSTRUCTION — WESTERN AUSTRALIA

Initially the Western Australian works were divided into three contracts:

- the supply and shipment of poles, clearance of the route, and the erection of poles
- the supply and erection of wire, insulators and saddles (a plate on the top of each pole to which the insulator was fixed)
- the shipping and erection of five pre-fabricated telegraph stations

The telegraph poles were specified as seasoned jarrah rather than iron because of the likely corrosion of the latter in the marine atmosphere. The poles were to be 5.2 metres long (17 feet), set into the ground at least 1.1 metres (3 feet 6 inches) at a spacing of 14 per kilometre (22 per mile). Thus, for the line which was initially thought to be 1278 kilometres long, more than 18 300 poles were ordered (allowing for spares and additional ones at river crossings). The poles were to be sawn 100 mm (4 inches) square in order to make them more stable for shipping. The wire was to be "charcoal iron" galvanized wire of No 7, 13 pound gauge, and was to be fitted to the top of each pole by a Siemens "double bell" insulator attached to the saddle plate.

Tenders for the works closed on 25 August 1874. The main tenderers were three of the colony's leading merchants who submitted tenders for various combinations of the three contracts, all of which were substantially above Fleming's estimates. Fleming argued that additional margins had been included in the tenders to allow for using unsurveyed landing places and for other uncertainties involved in the work. These uncertainties could be reduced by dividing the poling contract into three: the first for the supply of telegraph poles; the second for shipping and landing the poles and station materials at pre-arranged landing places; and the third for clearing the line and carting the poles from the landing places and erecting them.

Fleming also argued that savings could be obtained by the Government purchasing the wire, insulators and fittings directly from the suppliers (Siemens Bros of London). He was therefore permitted to negotiate with the only contractor who tendered purely for the wiring contract, a young builder, William Elsgood, for the removal of the supply of these items from the wiring contract. A "fair and reasonable" contract figure for the shipping and wiring works was agreed with Elsgood in November 1874.

Fleming's recommendations for the poling contract were accepted by the Government, and tenders were called for the three revised contracts, closing on 2 December 1874. Several tenders for various combinations of the contracts were received, but the lowest combination of tenders came from three contractors each of whom submitted a bid for only one of the three contracts. The contract for the supply of the poles went to William Spencer of Bunbury. He evidently subcontracted the work to the only two steam powered mills in the south-west, Western Australian Timber Company's mill at Lockeville, and Henry Yelverton's mill at Quindalup (both near Busselton). The shipping contract was awarded to an experienced coastal navigator, Captain W. W. Miles. The contract for clearing the route, and for carting and erecting the poles, went to James G Flindell, the only tenderer for the work. Flindell, a printer by trade, was at that time a

country innkeeper. Elsgood, the wiring contractor, was also awarded the contract for the erection of the prefabricated station buildings. The aggregate value of all the contracts was £33 653.

Governor Weld planted the first pole of the line in Albany on 1 January 1875 in his last official act as Governor of Western Australia but work on the line did not commence until April 1875. The first eighty kilometres (50 miles) of the line were to prove the most difficult to negotiate on the whole of the Western Australian section, due to heavy timber, undulating terrain, and numerous watercourses and boggy ground which had to be crossed. Because there was no prior survey, Fleming and the Jonathan Parish, a departmental foreman, reconnoitred the country fifteen to thirty kilometres ahead of Flindell's party and pegged the route. It was not until the route was poled nearly as far as the first telegraph repeater station at Bremer Bay, 220 kilometres (137 miles) from Albany, that Fleming was eventually provided with two government surveyors, Charles Price and H S Carey. Price was made responsible for determining the pole route and for siting the remaining telegraph stations: these were eventually located at Esperance, Israelite Bay and Eyre, then known as Eyre's Sand Patch. Fleming subsequently sailed in the shipping contractor's small sailing vessels on a number of occasions to determine suitable landing places for the poles and equipment, and to install equipment and batteries at telegraph stations.

The rafting ashore of the poles through the surf on the open coast east of Israelite Bay was an especially hazardous operation. On one occasion, in June 1876, Fleming reported that one of the vessels had to anchor for six days off Point Culver before weather conditions permitted it to land poles. On another occasion, one of the boatmen, Michael Reddin, was pinned under a raft in the surf and was drowned. Reddin was the only fatality recorded during the construction of the Western Australian section of the line. Fleming himself only narrowly escaped drowning when landing to inspect a possible telegraph station site.

The unpredictable nature of the south coast seas and weather took its toll on the contractor's small sailing schooners. At least three of the supply vessels became total wrecks after being caught in unfavourable locations by gale-force winds. The crew of another small vessel, approaching Esperance in June 1876, had to throw overboard its cargo of forage and supplies in order to save the craft from being run onto rocks and wrecked. The loss of these provisions delayed the progress of the wiring party by nearly six weeks. Weather conditions and a chronic shortage of labour at the Quindalup and Lockeville sawmills delayed the delivery of all poles from May 1876 onwards. To maintain progress Fleming agreed with the contractors that for the length of line east of Phillips River (Culham Inlet) only 7 poles to the kilometre (11 to the mile) were initially to be erected instead of the required 14 to the kilometre (23 to the mile). The contractors completed the poling on the return trip.

The bulk of the work in the poling contract consisted of hauling materials from the landing places on the coast and their distribution along the route of the line. Much of this work involved the laborious making of cart tracks through dense coastal scrub. Most of the hauling of materials was done by horse-drawn wagons but along certain parts of the coast special measures were required. Along one such length, east of Point Culver on the Nullarbor Plain, perpendicular cliffs, rising over 60 metres (200 feet) out of the ocean (now called Baxter Cliffs) stretch for 190 kilometres (120 miles). Fortunately, Price located a slip in the cliffs, 60 kilometres (37 miles) east of Point Culver, at the foot of which was a short length of beach where poles could be rafted ashore. At the site a specially designed derrick was erected and used to raise the 102 kilograms (2 cwt) poles and other equipment and provisions to the top of the cliff. A distribution centre was established there for carting material in both directions.

The flinty nature of the limestone plateau above the cliffs made it impossible to dig pole holes without extensive blasting. Along this section, the poles were therefore shortened, stepped in shallower holes, and supported by boulders stacked in cairns around their bases.

The only section of Fleming and Price's route which was criticised subsequently was the first 60 kilometres east of Israelite Bay where an unbroken stretch of beach was backed by drifting dunes, seasonal swamps and a densely wooded scarp. To avoid the difficult crossing of these, the line was erected just clear of the high water mark but the wires and insulators were continually drenched with salt spray. This seriously interfered with signal transmission and sometimes made the line unworkable for hours. This problem persisted until 1897 when the new inland line from Eucla to Coolgardie via Eyre, Balladonia and Norseman was opened. The new line turned away from the coast at Eyre, thus avoiding the section of the existing route most badly spray affected.

The absence of water supplies along the 260 kilometres (160 miles) from Eyre to Eucla, which had been a major difficulty for both Eyre and Forrest, also proved a problem for the telegraph contractors and surveyors. The main supply was provided by sea water condensers mounted on carts placed in the sea from which cooling pipes led to tanks on shore.

**NATIONAL ENGINEERING LANDMARK:
THE EAST-WEST TELEGRAPH, ADELAIDE TO PERTH, 1877**

11. COMPLETION OF THE LINE

After the Fowlers Bay to Eucla section of the line had been completed on 15 July 1877, the gap between Eucla and the end of the Western Australian line was closed by a weekly dispatch rider who operated the service for five months until 9 December 1877. On that date the completion of the line was recorded in the Perth Office Diary of the Western Australian Posts and Telegraph Department by the brief entry:

“Saturday, 7 p.m. Eucla line opened. Hurrah!”

While this work was going on, an additional line was strung between Adelaide and Port Augusta, with a special line of iron poles being erected as far as Roseworthy (about 45 kilometres north of Adelaide).

The total nett cost of the South Australian section was £68 205/5/1 after the sale of surplus horses, plant, and materials for £7471/3/8. In its first full year of operation (1878), the line earned £1512/8/2 which was not enough to cover the interest charges on the public loans which had been raised to finance the work. However, the East-West Telegraph finally united the nation.

Although some in Western Australia were sceptical of the benefits, nearly 11 000 messages were transmitted in the first year of operation and the volume grew rapidly thereafter. When gold was discovered at Kalgoorlie, the telegraph played a vital role in securing investors in London for new mines. Indeed, the mining boom of the 1880s and 1890s surpassed that of the 1850s.

Telegrams or “cables” were important sources of public news. The Melbourne *Argus* represented the Associated Press and distributed articles to newspapers in the other colonies and New Zealand. At ten shillings a word, the cables were necessarily brief but editors displayed them under bold headlines to maximise their impact such as this one from the *Western Australian Times*, 25 February 1879:

TELEGRAM

(Via Adelaide and Eucla)

Adelaide, February 24. London February 20.

All the attacks made at the Cape by the Zulus have been repulsed ...

Rapid communication underwrote stable and confident investment. Funding from British merchant bankers flowed into ‘go-ahead’ Colonial programmes that pushed roads, railways and the telegraph lines themselves outwards; built harbours and bridges; and nourished the spread of ancillary activities in the Colonies. [Moyal, p62]

**NATIONAL ENGINEERING LANDMARK:
THE EAST-WEST TELEGRAPH, ADELAIDE TO PERTH, 1877**

12. OPERATING THE TELEGRAPH

The Eucla telegraph station was inside Western Australia, 12 kilometres (8 miles) from the colonial border with South Australia, but it was operated by both colonies as a border facility with two separate station masters and two distinct staffs. There were some remarkable contrasts and lack of uniformity between the telegraph systems of the two colonies. The two systems even, used different telegraph codes. Western Australia used the Universal code (adopted by the Commonwealth after 1901) while South Australia used the Victorian (Australia) code. Much of the equipment was also different, including the poles, insulators, and batteries. The two sets of telegraphists sat opposite each other, separated by a partition. Each operator decoded incoming messages, wrote them out, and passed them through the partition for his opposite number to retransmit.

In 1895, because of the build-up in international traffic at the start of the Western Australian gold boom, the six telegraphists from each colony had to start manning the station on a 24 hour basis with two pairs working on each eight hour shift. Staffs were gradually augmented until, at peak manning in 1898, 15 operators from each colony were at work with five pairs on each shift. Eucla was then the busiest telegraph office outside the capital cities.

Simplex telegraph circuits were adequate until 1895 when, with the increase in traffic, duplex operation was adopted. This was a two-way system with simultaneous incoming and outgoing line transmission which permitted a single circuit to carry twice the traffic. In 1896 this was supplemented on the Western Australian side by a quadruplex apparatus but, because of the high resistance of the salt-encrusted coastal line, it was only worked as a triplex unit until the new line to Coolgardie via Eyre, Balladonia and Norseman was opened in 1897. A few years later another line of copper was strung over the same poles.

Although serving the settlers and communities of South Australia's Far West Coast, the coastal route presented several major problems. As with the line east of Israelite Bay, sea breezes deposited salt on the line, interfering with signal transmission, and traffic would have to be suspended until conditions improved. Sand drift often completely covered a pole and constant patrols and maintenance were required.

A second line from Port Augusta through the Gawler Ranges was added in 1896. The first pole was "truly placed" by the Mayor of Port Augusta West, Mr A Bothwell, on 30 April. A party of 12 men with J Murphy as Overseer built the 370 kilometre (230 mile) line to Flagstaff Landing, on the coast just north of Streaky Bay. To build the first 160 kilometres (100 miles) of the line, 2052 native pine poles were obtained from Angepena Station (about 300 kilometres north of Port Augusta in the Flinders Ranges). The remainder (2702 poles) were Oppenheimer galvanised wrought iron poles with cast iron bases. A repeater station was established at Yardea.

The new wire was then continued to Eucla by a party of eight men lead by T Hanley. This section of line was also reinforced by adding additional poles to increase the average number per kilometre from 10 to 12 (or from 16 to 20 per mile).

After the opening of the East-West telegraph, the main development of the Western Australian telegraph system was northwards. In 1878 the telegraph reached Northampton, in 1885 Cossack, and in 1889 Broome. This northwards extension into sparsely populated pastoral areas was vindicated in the same year when the Banjoewangi (Java) submarine cable came ashore at Broome and a second telegraph route from Australia to London became operational. This link was well timed to provide the London market with information on the Western Australian gold finds of the 1890s as an alternative link to the Overland Telegraph. A telegraph line from Perth to Coolgardie was completed in 1894, in time to cater for the explosion in telegraph traffic associated with the 1895-97 "Westralian" share boom on the London Stock Market. In 1895, the Coolgardie telegraph office dispatched the longest ever fully paid international telegram to leave Australia. It consisted of a mining prospectus, contained over 4000 words and cost about £600 to send. The Eyre to Coolgardie line opened in 1897 and provided a shorter and more reliable line from the goldfields to the eastern colonies and a faster alternative overseas line than the old East-West line.

In 1898 a new stone telegraph station building was built at Eucla by the Western Australian Government to replace the original prefabricated jarrah structures. In the new building both colonies operated a duplex and a quadruplex arrangement. At the same time the Western Australian repeater stations were also rebuilt in stone.

In 1901 a cable from South Africa via Mauritius and the Cocos Islands was brought ashore at Cottesloe (Perth). This cable largely superseded the Broome cable which was closed in 1914. In the following year (1902) the Cottesloe cable was extended to Adelaide which to some degree reduced the traffic through Eucla. In 1906, the Automatic Wheatstone transmission system was introduced and through-working between Perth and Adelaide was inaugurated. Eucla station was then operated by Western Australian telegraph staff only and its function was gradually downgraded to that of an automatic repeater station.

Although the Trans-Australian Railway was completed in 1917, it was not until 1927 that it was possible to add a three circuit line with copper wire to the railway telegraph poleing. This replaced the old East-West telegraph by a line well away from the baleful influences of the coast.

This new line, coupled with the growing use of wireless telegraphy, meant that the old East-West line was no longer needed. After 50 years of faithful (albeit sometimes erratic) service, the line was closed in 1927 as were all the Western Australian stations on the East-West line along with the telegraph stations at Smoky Bay and Yardea. However, the line continued to provide a service to wayside stations in South Australia as well as providing a bearer for two three-channel telephone systems and a four-channel telegraph system to Ceduna.

In 1970, a broadband microwave system across the Nullarbor, part of a network encircling the continent, was completed.

**NATIONAL ENGINEERING LANDMARK:
THE EAST-WEST TELEGRAPH, ADELAIDE TO PERTH, 1877**

BIBLIOGRAPHY

Western Australian Postal and Telegraph Department, Eucla Telegraph Extension, Correspondence, Tender and Contract Documents, Public Records Office, Western Australia, CONS 104, WAS 1243

Fleming, J C, Letter to The Hon. The Colonial Secretary, F P Barlee, Esquire, MLC, &c, on Anglo-Australian Telegraph Schemes, and Certain Proposals for a Telegraph System in Western Australia and Appendices, 10 February, 1870, printed at *The Perth Gazette and WA Times*, 1870

Western Australian Parliamentary Papers

Memorandum upon Electric Telegraph Department by Superintendent of Telegraphs, J C Fleming
Votes & Proceedings (V&P) 1874, Paper 6

Report upon Eucla Telegraph Line by Postmaster-General and by Superintendent of Telegraphs,
V&P 1876, Paper A10

Report of Postal and Telegraph Department 1876, *V&P* 1877, Paper 6

Report of Postal and Telegraph department 1877, *V&P* 1878, Paper 9

Claims of Officers employed on construction of Eucla Telegraph Line, *V&P* 1878, Paper 23

Appleyard, R, *The History of the Institution of Electrical Engineers (1871-1931)*, IEE, London, 1939.

Australian Academy of Technological Sciences and Engineering, *Technology in Australia, 1788-1988*, Melbourne, 1988

Blainey, G, *The Tyranny of Distance: How Distance Shaped Australia's History*, Sun Books, Melbourne, 1982

Bursill, Harry Oliver (ed.), *Souvenir of the Postal, Telegraph and Telephone Departments of Western Australia, 1898*, Postmaster-General, Perth, 1898

Cyclopedia of South Australia, 1907

Gooley, M J, *The Original Telegraph Line, South Australia - Western Australia 1875-1877: Its Construction, People and Localities*, Telecom, 1974

Gooley, M J, *Adelaide-Perth Telegraph Line Centenary Commemorative ceremony booklet*, Telecom, 1977

Green, J, *The Personal Touch: A Look at South Australia's Postal History from Proclamation Day to Present Day*, Australia Post, 1985

Hann, Peter W, 'Adelaide Eucla Telegraph', monograph, 1984

- Hartley, Richard G, *Industry and Infrastructure in Western Australia 1829-1940*, Institution of Engineers, Australia, Western Australia Division, Perth, 1995
- Hopewell, Val, 'Recollections of Eucla', *APO Magazine*, June-July 1963
- Lawrence, J, 'Perth - Adelaide Telegraph Link 1877' *Early Days, Journal and Proceedings of the Royal Western Australian Historical Society (RWAHSJP)* Vol 3, Dec 1945, pp 38-52
- Le Page, J S H, *Building a State. The Story of the Public Works Department of Western Australia, 1829 - 1985*, Water Authority of Western Australia, 1986
- Moyal, Ann, *Clear across Australia: A History of Telecommunications*, Thomas Nelson Australia, Melbourne, 1984
- Moynihan, J F, 'Some brief notes on Owners and Operators of Early Telegraph Lines in Western Australia, 1869-1873', Battye Library, Perth, PR 11168
- Oldham, Ray, 'George Phillip Stevens', *RWAHSJP* Vol. 10, Part 4, 1992, pp 408-22
- Prospectus of The Electro-Magnetic Telegraph Company, Western Australia, Perth, June 1870
- Stevens, G P, 'The East - West Telegraph, 1875-7', *RWAHSJP* Vol. 2, Part 13, 1933, pp 16-35
- Stevens, G P, 'Inauguration of the Electric Telegraph in Western Australia - 1869', *RWAHSJP* Vol 2, Part 20, 1936, pp 26-30
- Stirling, Horace, 'The Telegraph in Western Australia', *RWAHSJP* Vol. 1, Part 2, 1928, pp 30-33
- Taylor, Peter, *An End to Silence: The Building of the Overland Telegraph Line from Adelaide to Darwin*, Methuen, 1980
- Williams, T I, *A Short History of Twentieth Century Technology*, Clarendon Press, 1982
- Woodrow, B E, 'A Century of Telecommunications in the Northern Territory - Part 1: The Overland Telegraph', *The Telecommunications Journal of Australia*, October 1972